SECTION 08 34 49.01 20

HEMP SHIELDED DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI 304	Stainless Steel

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2015; Errata 2015) Structural Welding Code - Steel
AWS D9.1M/D9.1	(2012) Sheet Metal Welding Code

ASTM INTERNATIONAL (ASTM)

ASTM A1011	(2014) Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM A36	(2014) Standard Specification for Carbon Structural Steel
ASTM A568	(2015) Standard Specifications for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2015; ERTA 2015) Life Safety Code

AM#10... ...AM#10

AM#10... ...AM#10

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-HDBK-423	(15 May 1993) High-Altitude Electromagnetic Pulse (HEMP) Protection for Fixed and Transportable Ground-Based C4I Facilities, Volume I: Fixed Facilities (Metric)
MIL-STD-188-125-1	(1998; Basic; Notice 1 2005) High-Altitude Electromagnetic Pulse (HEMP) Protection

for Ground-Based C41 Facilities Performing Critical, Time-Urgent Missions, Part I Fixed Facilities

1.2 DESCRIPTION

This section covers the design, fabrication, installation, and testing of **AM#10... ...AM#10** high-altitude electromagnetic pulse (HEMP) shielded **AM#10...doors...AM#10** and the associated door control, interlock, and alarm sub-subsystems. These doors are incorporated into facilities containing systems which provide protection against the effects generated by a HEMP event in accordance with MIL-STD-188-125-1.

The implementation and performance of the HEMP shielded **AM#10...doors...AM#10** shall comply with the requirements of MIL-STD-188-125-1 and shall be in general accordance with the guidelines of MIL-HDBK 423 unless otherwise shown in the project HEMP design drawings, based upon reference HEMP details included in RFP documents or explicitly stated in these specifications. In the event of conflict between this specification and MIL-STD-188-125-1 or other specifications sections, the contractor shall notify the Contracting Officer in writing.

1.3 DEFINITIONS

1.3.1 Regularly Engaged

As it applies to the testing company is defined to mean that the testing company has been regularly and successfully engaged in testing of EM shield systems during the previous 5 years.

1.3.2 Independent

As it applies to the testing company is defined to mean that the company has no financial interest and not directly or indirectly part of the shielding Contractor, subcontractor, or general contractor QC organization.

1.3.3 Shielding Attenuation

As it applies to this section is defined as the shielding effectiveness. Shielding effectiveness at a test area for the purpose of this procedure is the ratio expressed in decibels (dB), of the received signal when the receiving antenna is illuminated by electromagnetic radiation in the test calibration configuration (no shield present) to the received signal through the electromagnetic barrier in the test measurement configuration. Assuming that antenna voltage is detected.

SE = 20 log(Vc/Vm)

Where Vm is the measured signal at the test area and Vc is the calibration signal at the same frequency and transmitting antenna polarization. Shielding effectiveness values are test-method dependent and different values may be obtained when time-domain or other frequency-domain measurement techniques are used.

1.4 Corrections and Repair

AM#10...Replace...AM#10 defective part(s) with identical parts which are shown in approved shop drawings, parts list, catalog, and maintenance manual. This includes cleaning, adjustment, and tightening.

1.5 **AM#10...Deleted...AM#10**

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submittals with an "S" designation following the "G" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29.01 00 SUSTAINABILITY REPORTING. Other designations following the "G" designation identify the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.01 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

HEMP shielded door installation; G JCM

Electrical connectivity; G JCM

Shop Drawings; G JCM

SD-03 Product Data

Shielded door frame and leaf; G JCM

Hardware and accessories; G JCM

Hinges; G JCM

Panic hardware; G JCM

SD-06 Test Reports

Swinging door static load test; G JM

Swinging door sag test; G JM

Door closure test; G JM

Handle pull test; G JM

Door Electromagnetic Shielding Test ; G J

Submit test reports for specified tests under paragraph entitled "Source Quality Control." Test reports shall contain as minimum, list of equipment used with calibration data, test point location, date, project title and location, location of signal source, dynamic range, noise floor, SA (required and actual), any repair performed, person performing the test and witness signature.

SD-07 Certificates

Certification of welders; G JM

SD-08 Manufacturer's Instructions

Test plan; G JCM

Welding procedures; G JCM

SD-10 Operation and Maintenance Data

Hardness Maintenance and Hardness Surveillance (HM/HS) Manual, Data Package 3; G JCM

Submit in accordance with Section 01 78 23.01 00 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

HEMP Shielded Door Factory Testing; G JCM

Submit test reports for specified tests under paragraph entitled "Field Quality Control." Test reports shall contain as a minimum, list of equipment used with calibration data, test point location, date, project title and location, location of signal source, dynamic range, noise floor, SA (required and actual), any repair performed, person performing the test and witness signature. Log the test data for each test point on the form as the test progresses. Have the witness sign the data form at the end of each day.

1.7 QUALITY ASSURANCE

1.7.1 HEMP Shielded Door Manufacturer Qualifications

Shielded doors shall be new and shall be standard products of a manufacturer regularly engaged in the manufacture of such products for at least the previous 5 years. The shielded doors shall essentially duplicate items that have been in satisfactory use for a period of at least 2 years. Points of contact for previous shielded door installations including the Names and telephone numbers of the users and/or owners of facilities where the proposed doors have been installed within the previous five years shall be submitted to the Contracting Officer. Shielded door vendor identification and experience data, drawings and catalog cuts for the doors to be supplied, manufacturer recommended installation and maintenance procedures, and other printed documentation shall be submitted to the Contracting Officer for approval at least 60 days before shield assembly and installation is scheduled to commence.

1.7.2 **AM#10...Deleted...AM#10**

1.7.3 Certification of Welders

Prepare detailed procedures for training and qualifying all welders on the specific types of welds they will be performing. Before assigning welders to work covered by this section, submit the names of the welders to be employed, together with certification that each welder has passed the applicable qualification tests within the last 2 years in the processes specified in AWS D1.1/D1.1M and AWS D9.1M/D9.1. Welder qualification certificates shall be submitted to the Contracting Officer for each qualified welder before that individual is permitted to perform work on the project. Whenever the results of welder monitoring create a reasonable doubt of a welder's proficiency, that individual shall be removed from the job and retrained/recertified or discharged. Welder disqualification notices and recertification notices shall be provided to the Contracting Officer within 24 hours of the event.

1.7.4 Welding Procedures

Prepare detailed procedures for all types of welds required for HEMP shield door installation. The welding procedures shall be submitted to the Contracting Officer. The procedures shall be derived from the appropriate AWS standard(s) and shall include the types of welds to be performed, the welding materials to be used, detailed welding procedures, and the ambient environmental conditions to be maintained. The welding procedures shall emphasize the requirement for continuous, defect-free, low resistance welds. Procedures shall also be developed for monitoring the quality of the welds produced by each qualified welder. The welder qualification and monitoring procedures shall be submitted to the Contracting Officer for approval.

1.7.5 Shop Drawings

HEMP shielded door shop drawings shall be prepared and submitted to the Contracting Officer for approval. Front view, side view, and cross-sectional view drawings shall be included. The assembly drawings shall provide a complete list of shielded door frame and leaf materials and parts, arrangements, dimensions, clearances, and the installation method and sequence. Complete information on hinges, **AM#10... ...AM#10** hardware, and other accessories shall be provided. Details of door frame attachment to the host shielded enclosure shall be shown. Complete and detailed information describing door control system operation for both individual and multiple doors arranged as a Personnel Entry Vestibule (PEV) shall be provided.

Hardness critical items, assemblies and hardness critical processes shall be identified on shielded door shop drawings with HCI, HCA, and HCP symbols, respectively, per MIL-STD-188-125-1 and MIL-HDBK-423.

1.8 DELIVERY, STORAGE, AND HANDLING

Exercise great care when packing, shipping, unpacking, and installing the HEMP shielded door and frame **AM#10...assemblies....AM#10** HEMP shielded **AM#10...doors...AM#10** shall be shipped assembled with the door frame to hold the door and frame in alignment. Packaging shall include physical, and moisture protection, to ensure door assembly is delivered to jobsite in a clean, corrosion-free, and undamaged condition. HEMP shielded door shall not be accepted at the jobsite with visible damage. Provide appropriate physical, temperature, and moisture protection upon door arrival at jobsite and before, during, and after door installation through completion of host building construction.

1.9 WARRANTY

AM#10...Provide 15 year warranty for door frame and door leaf, 5 year warranty on the door hardware and controllers and 1 year on pneumatic door seal....AM#10 Parts and labor for operating mechanisms, including any interlocking components, shall be warranted by the Contractor for at least 3 years following the date of beneficial use. Any part of these mechanism(s) or component(s) causing operational malfunction or attenuation degradation below that required by MIL-STD-188-125-1 during the warranty period shall be repaired or replaced, including any required re-installation and re-testing by the Contractor.

1.10 MAINTENANCE

1.10.1 Hardness Maintenance and Hardness Surveillance (HM/HS) Manual

Submit HEMP HM/HS manual for the HEMP shielded doors. The HM/HS manual will detail the combined routine and preventive maintenance, inspection, test, and repair activities performed on HEMP door to ensure that HEMP hardness is retained throughout system life cycle of the HEMP shielded door. The HEMP shielded door is a hardness critical assembly which shall function properly while providing the required SA performance throughout its operational lifetime. Contents of the HM/HS manual shall include but shall not be limited to operational procedures; routine, preventive and corrective maintenance; **AM#10... ...AM#10** alignment of doors; **AM#10... ...AM#10** replacement of gaskets; **AM#10... ...AM#10** lubrication operation and repair of interlock **AM#10... ...AM#10** mechanisms; and adjustment of hinges.

1.10.2 Spare Parts

One set of manufacturer recommended spare parts and maintenance supplies sufficient for a 3 year period shall be furnished for each shielded door. Lubricants, cleaning solvents, and coatings required for shielded door maintenance shall be environmentally safe. Where practical, shielded doors shall be designed to be maintained without requiring the use of special tools. If special tools are required, one set of the special tools shall be provided for each type of door provided under this Section.

PART 2 PRODUCTS

2.1 GENERAL

The HEMP shielded doors provided under this section shall be of the **AM#10... ...AM#10** pneumatic (RF gasketed air bladder) type. All HEMP shielded doors **AM#10... ...AM#10** shall be provided by the same manufacturer. HEMP shielded door rough and clear opening dimensions shall be as detailed on facility design drawings.

Shielded doors shall be furnished as complete assemblies including rigid structural frames, leafs, hinges, **AM#10... ...AM#10** and all other parts necessary for operation. Door control systems shall include all necessary hardware and accessories. Each required electrical filter shall meet MIL-STD-188-125-1 acceptance and verification pulsed-current injection (PCI) performance requirements.

HEMP shielded door assemblies shall be suitable for repetitious use. Adequate structural strength and permanent sealing is required to meet the total specification, usage, and 15 year service life requirements. Assemblies including doors, hardware, shielding devices, sealing operating mechanisms, and other components shall function properly through 100,000 cycles of use while maintaining the shielding effectiveness requirements provided in this section.

2.1.1 Shielding Effectiveness Performance

When installed into the host facility, the shielding effectiveness of the HEMP shielded door shall meet the minimum performance requirements provided in MIL-STD-188-125-1. The HEMP shielded door shall provide a shielding effectiveness performance margin of **AM#10...20...AM#10** dB above that required by MIL-STD-188-125-1.

2.1.2 HEMP SHIELDED DOOR FRAME AND LEAF

Shielded door frames and leafs shall be non-sagging and non-warping, and formed from **AM#10...304...AM#10** stainless steel. Material used to fabricate the door frame shall be suitable for welding to host facility surrounding structure and shield. All steel shall conform to ASTM A36, ASTM A568, ASTM A1011, or AISI 304 and shall be stretcher leveled and installed free of mill scale. Shielded door frames and leaf shall be provided with a **AM#10...paint...AM#10** primer by the manufacturer

2.1.3 Hinges

Provide loading dock HEMP shielded doors with a minimum of **AM#10...two...AM#10** heavy-duty, well-balanced hinges suitable for equally distributing the weight of the shielded door leaf. Provide other interior doors with heavy-duty continuous hinges as noted on Door Schedule. Force necessary to set the HEMP shielded door in motion shall comply with NFPA 101. Provide lubricating fitting at each hinge unless not required by the design of the hinge or the bearing.

2.1.4 **AM#10...Operation...AM#10**

HEMP shielded doors for Personnel Entry Vestibules shall be opened by push paddles, plates or emergency exit devices to release air seal. The force required to manually **AM#10... ...AM#10** open or close the shielded doors shall not exceed 15 pounds.

Unless otherwise shown on the facility design drawings a HEMP shielded door shall be operable from either side of the door. For facility security or other requirements, a HEMP shielded door may be operable from one side.

2.1.5 Door Stop

HEMP shielded doors shall be provided with stop devices.

2.1.6 Door Operation Counter

A door operation counter shall be provided on the interior if the manufacturer's recommended maintenance procedures schedule maintenance activity as a function of the number of door operations.

2.1.7 **AM#10...Deleted...AM#10**

2.2 EMERGENCY EXIT HEMP SHIELDED DOOR

Regardless of type, a HEMP shielded door provided for facility emergency egress shall be provided with panic hardware. The force required to **AM#10...operate...AM#10** the emergency exit HEMP shielded door shall meet Life Safety Code NFPA 101. Alterations or modifications in the field to panic hardware are prohibited.

2.3 PNEUMATIC TYPE DOOR

The RF seal of a pneumatic type HEMP shielded door shall be formed by a continuous circumferential metal-to-metal contact between the door frame and door leaf provided by an intervening metallic RF mesh-covered air **AM#10...seal....AM#10** The RF seal shall be implemented by exertion of force from the pneumatic pressure system that shall maintain adequate

AM#10...air...AM#10 sealing pressure to join the conductive mating surfaces of the door leaf and frame. Factory-prepared door leaf and frame contact surfaces shall provide a corrosion-resistant, conductive, long-life finish.

AM#10... ...AM#10

As required, each single door or multiple door Personnel Entry Vestibule shall be provided with a single stand-alone door controller. Doors shall unseal to allow manual operation within a half second. The controller shall be designed to disengage any interlocks and unseal all doors in case of emergency. As required by project specifications, door control systems shall include interfaces to building automation and control systems for door status (open / close) monitoring and emergency operation. Location of door controller shall be as indicated on facility design drawings but must be within the facility HEMP-protected volume.

2.4 HEMP SHIELDED DOOR PEV INTERLOCKS, INDICATING LIGHTS, AND ALARMS

2.4.1 PEV Door Interlock

Positive shielded door interlocks for multiple HEMP shielded doors configured as a Personnel Entry Vestibule (PEV) shall be provided such that, under normal conditions, the RF seal of only the inner or only the outer door or doors of a PEV door set can be broken at a time (i.e., the integrity of the host facility shielded volume is maintained during passing through a PEV door set). Local override of the interlock in the event of emergency, circuit malfunction, or if one of the doors is inadvertently left open shall be provided. Remote override of the interlock from fire alarm or other emergency alarm systems shall be provided. Loss of power to the interlock circuit shall automatically unlock all PEV doors.

2.4.2 Indicating Lights

Door status indicating lights shall be provided on the outside of the outer door(s) and on the inside of the inner door(s) of each vestibule shielded door set. The lights shall turn on steady to indicate the OPEN or CLOSED status of the opposite doors of the set. The lights shall flash when both doors are open or when the door interlock override is activated. The indicating light panel shall provide a warning that an alarm will sound if both doors are simultaneously open.

2.4.3 Alarms

An audible alarm shall be provided to indicate that both one or more inner and outer doors of a vestibule shielded door set are open, compromising the integrity of the host facility shielded volume. The alarm shall continue to sound until either all inner or all outer or both PEV doors are closed. Low-voltage piezoelectric-type alarms in tamper-proof enclosures shall be installed in locations shown on the host facility HEMP design drawings. The sound intensity shall be 45 dBA minimum at 10 feet.

2.5 PAINTING

HEMP shielded door manufacturer or installer shall paint HEMP shielded door with an environmentally acceptable **AM#10... ...AM#10** primer. **AM#10... ...AM#10** HEMP shielded door may be factory finish painted. Any damage to the factory painted surfaces that occurs during installation shall be touched-up. Follow all door manufacturer instructions and recommendations

when painting door. Do not paint RF contact surfaces. **AM#10... ...AM#10**

2.6 ELECTRICAL CONNECTIVITY

Install door controls, sensors, alarms, interlocks and filters in accordance with HEMP shielded door manufacturer's instructions, NEC requirements, and design drawings.

2.7 HEMP SHIELDED DOOR FACTORY TESTING

At least one HEMP shielded door of each type to be provided to the project shall be tested by the door manufacturer to demonstrate satisfactory compliance with requirements of the swinging door static load test, the swinging door sag test, the door closure test, the handle pull test, and the door electromagnetic shielding effectiveness test. A Factory Test Plan for the HEMP shielded door factory testing shall be prepared by the door manufacturer and shall be submitted to the project HEMP shielding specialist and Contracting Officer for approval. The Contracting Officer shall be notified at least 30 days before the scheduled performance of the factory tests, and the Government reserves the right to witness all required testing. Factory test results shall be documented in a HEMP Shielded Door Factory Test Report and submitted to the project HEMP shielding specialist and Contracting Officer. The test doors shall not be furnished on the project. Alternatively, test reports from prior doors of same construction type and same or larger size may be provided in lieu of performing additional tests.

2.7.1 Swinging Door Static Load Test

The HEMP shielded door under test shall be mounted and latched in its frame and placed in a horizontal position, such that it opens downward. Only the frame shall be rigidly and continuously supported from the bottom. A load of 40 pound/square foot shall be applied uniformly over the entire surface of the door leaf for at least 10 minutes. The door shall not be acceptable if this static load test causes breakage, failure, or permanent deformation or causes the clearance between the door leaf and frame to vary more than 1/16 inch from the original dimension.

2.7.2 Swinging Door Sag Test

The HEMP shielded door under test and its frame shall be installed in a vertical position and the door shall be opened 90 degrees. Two 100-pound weights, one on each side of the door, shall be suspended from the door within five inches of the outer edge for at least 10 minutes. The door shall not be acceptable if this saq test load causes breakage, failure, or permanent deformation or causes the clearance between the door leaf and frame to vary more than 1/16 inch from the original dimension.

2.7.3 Door Closure Test

The HEMP shielded door under test shall be operated for at least 100,000 complete open-close cycles. The door shall not be acceptable if this closure test load causes breakage, failure, or permanent deformation or causes the clearance between the door leaf and frame to vary more than 1/16 inch from the original dimension.

2.7.4 **AM#10...Deleted...AM#10**

2.7.5 Door Electromagnetic Shielding Test

The shielding effectiveness of the HEMP shielded door under test shall be factory tested, both before and after the mechanical tests described in this specification (Swinging Door Static Load Test, Swinging Door Sag Test, Door Closure Test, and Handle Pull Test) to demonstrate compliance with the requirements of this specification. No maintenance other than manufacturer-recommended routine preventive maintenance and HM/HS procedures shall be performed following the mechanical tests. The shielding effectiveness shall be measured in accordance with the test procedures provided in Appendix A of MIL-STD-188-125-1. The door shall not be acceptable if it fails to provide at least the minimum required shielding effectiveness required by MIL-STD-188-125-1.

PART 3 EXECUTION

3.1 HEMP SHIELDED DOOR MANUFACTURER QA/QC

The HEMP shielded door manufacturer shall implement in-plant quality assurance / quality control procedures to ensure that the HEMP shielded door is fabricated in accordance with the approve shop drawings.

3.2 HEMP SHIELDED DOOR INSTALLATION

HEMP shielded door shall be installed by appropriately certified welders in accordance with manufacturer's recommendations and instructions. The HEMP shielded door assemblies shall be installed as complete assemblies in **AM#10... ...AM#10** prepared openings. The host facility shall provide sufficient structural support for the HEMP shielded door assembly.

The frame of the HEMP shielded door shall be continuously welded to the host facility support structure and shield as detailed in the design drawings. The door frame shall be welded to the facility support structure and HEMP shield using welding method(s) appropriate for the materials being welded. The installer shall use skip welding technique to minimize warpage or misalignment that would degrade HEMP shielded door operational or shielding effectiveness performance. Alignment shall be maintained within tolerances shown in approved shop drawings during rough installation, tack welding, and final weld out. The welds shall be in-progress tested. The installer shall exercise care during installation to prevent damage **AM#10... to ...AM#10** RF gaskets and all other door components.

3.3 **AM#10...Delete...AM#10**

3.4 POST INSTALLATION PROTECTION

After HEMP shielded doors have been installed, temporary protection shall be provided to prevent damage to door operating mechanism, thresholds, RF contact surfaces and components, and other fragile RF shielded door elements during the overall facility construction project. Shielded door leafs may be temporarily removed, or they may be blocked in the open position. If not blocked open, opening and closing of HEMP shielded door shall be kept to a minimum, in order to limit wear on door components, particularly contact surfaces. The protection shall be removed during performance of the preliminary shielding effectiveness testing and then reinstalled. The protection shall also be removed before shielding effectiveness acceptance testing.

3.5 HEMP SHIELDED DOOR INSTALLATION QUALITY CONTROL AND TESTING

The HEMP shielded door installation quality control program shall include in-progress primary shield weld inspections and testing of welds joining the door frames to the facility HEMP shield and all other hardness critical welds.

HEMP shielded door testing shall include preliminary shielding effectiveness testing and shielding effectiveness acceptance testing performed as part of the formal MIL-STD-188-125-1 acceptance shielding effectiveness testing of the host facility HEMP protection system. Prior to any shielding effectiveness tests the HEMP shielded door shall be cleaned in accordance with manufacturer and other HM/HS instructions. Refer to Section 13 27 54.01 10 HIGH ALTITUDE ELECTROMAGNETIC PULSE (HEMP) PROTECTION SUBSYSTEMS covering the HEMP Protection Systems of the host facility construction project.

3.6 SITE SPECIFIC REPAIRS AND TEMPORARY FIXES

All HEMP shielded door corrections and repairs shall be approved by the Contracting Officer. 5 Modifications to the door and frame design will not be allowed. **AM#10... ...AM#10** Only materials shown in approved shop drawings, catalogs, HM/HS manual, and/or on the list of materials, shall be used. All HEMP shielded doors of the same design shall contain identical RF gasket materials, where utilized.

3.7 TRAINING

Provide a minimum of 8 hours of hands on maintenance training to each person designated by the Contracting Officer. Training shall include but shall not be limited to operational procedures; routine, preventive and corrective maintenance; **AM#10... ...AM#10** alignment of doors; **AM#10... ...AM#10** replacement of gaskets; **AM#10... ...AM#10** lubrication, operation and repair of interlock, **AM#10... ...AM#10** and adjustment of hinges.

3.8 RETESTS

Retest each repair, adjustment, corrective action including cleaning or HEMP shielded door at each frequency for each test point. If retest is scheduled for a later date, Contractor shall provide 30 days notice for Continental United States and 45 days notice for overseas locations for Government to witness the retests. Recalibrate if the dynamic range varies more than 3 dB compared to the beginning of the calibration of each day. Retest each test points. Recalibrate if any hardware is changed.

-- End of Section --